

Name \_\_\_\_\_

## STUDY GUIDE Chapter 12: DNA and Chromosomes

1. The process whereby one strain of bacterium is apparently changed into another strain is called \_\_\_\_\_. This process was discovered by \_\_\_\_\_. Because of his experiment, \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_ were able to determine that the substance that was capable of transmitting the genetic information was DNA.
2. Using radioactive isotopes in viruses \_\_\_\_\_ and \_\_\_\_\_ confirmed that DNA, rather than protein, is the genetic material of cells. \_\_\_\_\_ and \_\_\_\_\_'s work with X ray diffraction showed patterns that indicated DNA's shape is a helix, which then allowed \_\_\_\_\_ and \_\_\_\_\_ to determine that the 3-D structure of DNA is a double helix.
3. The building blocks of nucleic acids are \_\_\_\_\_. In DNA, each building block is composed of one \_\_\_\_\_, one \_\_\_\_\_ group, and one \_\_\_\_\_ base. \_\_\_\_\_ and \_\_\_\_\_ are purines while \_\_\_\_\_ and \_\_\_\_\_ are pyrimidines.
4. Chargaff determined that, in a given sample of DNA, the number of adenine bases is always equal to the number of \_\_\_\_\_ bases and the number of cytosine bases is always equal to the number of \_\_\_\_\_ bases.
5. DNA is composed of 2 strands that are \_\_\_\_\_ to each other with the 5' and 3' ends running in opposite directions. The backbone is composed of \_\_\_\_\_ and \_\_\_\_\_. The 2 strands are held together by weak \_\_\_\_\_ bonds between the complementary \_\_\_\_\_ bases.
6. \_\_\_\_\_ bonds with thymine and \_\_\_\_\_ bonds with guanine. So if 15% of a DNA sample is made up of guanine, \_\_\_\_\_% would be made up of cytosine, \_\_\_\_\_% would be made up of thymine, and \_\_\_\_\_% would be made up of adenine.
7. The proteins around which DNA coils are called \_\_\_\_\_. The complex consisting of DNA and histones is called \_\_\_\_\_. Each bead-like unit of chromatin is called a/an \_\_\_\_\_. The DNA wraps at several levels, compacting into a \_\_\_\_\_.
8. DNA replication is \_\_\_\_\_, as each replicated DNA molecule has one original strand and one new strand. The strands unwind and the enzyme \_\_\_\_\_ adds complementary bases to the template. After the sugar-phosphate backbones seal back up, the result is \_\_\_\_\_ DNA molecules that are \_\_\_\_\_ to each other and the original DNA molecule.
9. DNA replication occurs during the \_\_\_\_\_ phase of the cell cycle. In prokaryotes, replication occurs in the *cytoplasm* and starts from a \_\_\_\_\_ point on the DNA. However, in eukaryotes, it occurs simultaneously from \_\_\_\_\_ starting points on the DNA, which is found in the *nucleus*.
10. Locally opened portions of the DNA double helix are called \_\_\_\_\_. DNA replication proceeds in a \_\_\_\_\_ to \_\_\_\_\_ direction, so replication on one strand is continuous but the other is discontinuous, producing small pieces called \_\_\_\_\_ fragments.

11. Write the correct enzyme next to its job:

- Proofreads and adds DNA nucleotides to the RNA primer \_\_\_\_\_
- Joins Okazaki fragments and seals sugar-phosphate backbone \_\_\_\_\_
- Unwinds and separates strands \_\_\_\_\_
- Makes a short stretch of RNA on the DNA template \_\_\_\_\_
- Removes RNA primers \_\_\_\_\_

12. The entire set of genetic information that an organism carries in its DNA is its \_\_\_\_\_. A chromosome chart that shows the diploid set of chromosomes is called a \_\_\_\_\_, which groups chromosomes in pairs in order of \_\_\_\_\_ size.

13. Normal human diploid zygotes contain \_\_\_\_\_ total chromosomes. A typical female's sex chromosomes are \_\_\_\_\_ while a male's are \_\_\_\_\_.

14. A/an \_\_\_\_\_ chromosome has one long arm (q) and one short arm (p). A/an \_\_\_\_\_ chromosome pinches off a small amount toward one end. A/an \_\_\_\_\_ chromosome has two arms of approximately equal length.

15. Typically, an individual with Down syndrome has \_\_\_\_\_ total chromosomes, and individual with Turner syndrome has \_\_\_\_\_ total chromosomes, and an individual with Klinefelter syndrome has \_\_\_\_\_ total chromosomes.

16. \_\_\_\_\_ is when homologous chromosomes do not separate properly, resulting in an abnormal chromosome number. This error occurs in \_\_\_\_\_ of meiosis. \_\_\_\_\_ is when there is an extra chromosome in the cells and \_\_\_\_\_ is when the cells are missing one chromosome.

17. Explain 3 genetic disorders that could result from the nondisjunction of autosomes.

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18. Explain 2 genetic disorders that could result from the nondisjunction of sex chromosomes.

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19. Trisomy 21 is more commonly known as \_\_\_\_\_. An individual with a single X chromosome has \_\_\_\_\_ syndrome and is considered female. An individual with 2 X chromosomes AND a Y chromosome has \_\_\_\_\_ syndrome and is considered male. Individuals with one Y chromosome and no \_\_\_\_\_ chromosome will not survive to birth!

20. An extra copy of part of a chromosome is known as a/an \_\_\_\_\_, the loss of part of a chromosome is called a/an \_\_\_\_\_, and a/an \_\_\_\_\_ reverses the direction of parts of the chromosome.

21. In a/an \_\_\_\_\_, part of one NON-homologous chromosome breaks off and attaches to another. In a/an \_\_\_\_\_, a larger sequence is inserted into a chromosome due to unequal crossing over during \_\_\_\_\_.

Normal                      a b c d e f g h i j k l m n

A. \_\_\_\_\_          a b c d e f g h i j k l m n l m n

B. \_\_\_\_\_          a b c d e k j i h g f l m n

C. \_\_\_\_\_          a b c d e f l m n

3' – A G C C T T G A C G T A T G C – 5'  
5' – – 3'

3' – G A C T A T A G C T G C A G A – 5'  
5' – – 3'